

c. Amendments to Claims

1. (currently amended) An apparatus for mode converting, comprising:
first and second optical waveguides; and
a GRIN fiber lens attached to both the first and the second waveguides; and
wherein one end of the GRIN fiber lens is attached directly to an end of the first optical waveguide and an opposite end of the GRIN fiber lens is attached directly to an end of the second optical waveguide; and
wherein the first and second waveguides have fundamental propagation modes of different size.

2. (previously presented) The apparatus of claim 1, wherein the attached ends of the first and second waveguides are fused or glued to the GRIN fiber lens.

3. (original) The apparatus of claim 2, wherein the first and second waveguides are first and second optical fibers, respectively.

4. (currently amended) The apparatus of claim 3, wherein the first fiber has a fundamental propagation mode ~~modes~~ with a different size ~~sizes~~ than a fundamental propagation mode of the second fiber.

5. (currently amended) ~~An~~ The apparatus of claim 3, for mode converting,
comprising:
first and second optical fibers; and
a GRIN fiber lens attached to both the first and the second optical fibers; and
wherein one end of the GRIN fiber lens is attached directly to an end of the first optical fiber and an opposite end of the GRIN fiber lens is attached directly to an end of the second optical fiber; and

wherein the lens has a magnification, the magnification times the size of a fundamental propagation mode of the first fiber being about equal to the size of a fundamental propagation mode of the second fiber.

6. (original) The apparatus of claim 3, wherein the first and second fibers have cores with different diameters.

7. (currently amended) An ~~The~~ apparatus of ~~claim 3~~, for mode converting,
comprising:

first and second optical fibers; and

a GRIN fiber lens attached to both the first and the second fibers; and

wherein one end of the GRIN fiber lens is attached directly to an end of the first optical fiber and an opposite end of the GRIN fiber lens is attached directly to an end of the second optical fiber; and

wherein each fiber has a core and a cladding; and a discontinuity in refractive index across an interface between the core and cladding, the discontinuities being different across the interfaces of the first and second fibers.

8. (currently amended) The apparatus of claim 3, wherein the GRIN fiber lens comprises a series of connected GRIN fiber lenses; , the first GRIN fiber lens of the series being attached to the first fiber and the last GRIN fiber lens of the series being attached to the second fiber.

9. (currently amended) An ~~The~~ apparatus of ~~claim 1~~, for mode converting,
comprising:

first and second optical waveguides; and

a GRIN fiber lens attached to both the first and the second waveguides; and

wherein one end of the GRIN fiber lens is attached directly to an end of the first optical waveguide and an opposite end of the GRIN fiber lens is attached directly to an end of the second optical waveguide; and

wherein the GRIN fiber lens has a core with a graded refractive index profile, the profile having a radial second derivative whose average magnitude is less than about 2.4×10^{-5} microns⁻² in the core.

10. (new) The apparatus of claim 1, wherein the optical waveguides have diameters of about the diameter of the GRIN fiber lens.